SUMMARY OF A FOREST SERVICE ADMINISTRATIVE TEST OF ORTHODICHLOROBENZENE EMULSION FOR CONTROL OF THE MOUNTAIN PINE BEETLE--WASATCH NATIONAL FOREST, 1941

By

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Orthodichlorobenzene emulsion prepared with Triton 720[1] as an emulsifier was found by Mr. R. R. Whitten of the Forest Insect Laboratory at Morristown, N. J., to be effective in killing elm bark beetle larvae in experimental tests in the East. The possibility of using this material for control of pine bark beetles in the West was pointed out in correspondence by Dr. F. C. Craighead. Immediately the Forest Service became interested in testing the effectiveness of the emulsion against the mountain pine beetle in lodgepole pine, for this material would, if effective, reduce the high transportation costs characteristic of the orthodichlorobenzene and diesel oil method. Therefore it was agreed between the Forest Service and the Bureau of Entomology and Plant Quarantine that an administrative test would be undertaken on the Wasatch control project during the spring of 1941. Accordingly, on June 25 and 26 a series of infested lodgepole pines were treated. The results were checked on July 8 and again on September 16 and 17.

1/ According to Mr. Whitten, Triton 720 is the sodium salt of an alkyl argl poly ether sulfonate. It is manufactured by Rohm and Haas Co., 222 West Washington Square, Philadelphia, Pa.

Spray formula. The spray materials used in the experiment were mixed in the proportions suggested by Whitten, as follows:

Material	Amount
Triton 720	100 cc.
Orthodichlorobenzene	1/2 gallon
Water	2 gallons

Experimental area. The experiment was undertaken on an area approximately 1/2 mile east of the Soapstone utilization road and near the divide between the Provo River and Iron Mine Creek. At this point the elevation is nearly 10,000 feet and the land slopes gradually to the west. Predominantly large over-mature lodgepole pine and a light mixture of Engelmann spruce constitute the timber type. In recent years extensive killing of lodgepole by pine beetles has seriously reduced the amount of living timber and has resulted in many large openings in the stand. There is a considerable amount of advanced reproduction occurring in groups. In general the physical conditions of the area seem favorable for success of the penetrating oil method of bark beetle control.

Experimental set-up and procedure. A total of 76 trees of random sizes ranging in diameter from 10 to 28 inches were chosen for the study. Seventy-one of these trees were treated and 5 were left untreated to act as checks. In 11 treated trees and 3 checks pine beetle larvae and pupae were present with the larvae predominating. In the remaining 62 trees the brood was wholly in the larval stage.

The trees were felled, limbed, and topped preparatory to application of the spray. The same equipment and method used in treating with ortho and fuel oil was employed in applying the emulsion to the trees. All the treaters were experienced control men taken temporarily from the Wasatch project and some of them had had considerable experience with the oil spraying method. All the treating was personally supervised, and it is felt that nothing was lacking in the way of thorough spray coverage.

Weather during the treating was hot and windy, conditions that caused rapid evaporation from the treated trees. Within 1/2 hour after application of the spray the trees showed little visual evidence of treatment. Sun killing of the brood on the top side of the logs was evident within a few hours after felling.

Transportation of the orthodichlorobenzene and Triton from the Soapstone utilization road to several depots in the vicinity of the treating was by pack stock. The same animals were used to carry water from a nearby pond. All the water had to be strained through a fine wire mesh before it could be used successfully in the pumps. Even then there were some difficulties with clogging of the nozzles.

The emulsion was prepared at convenient places where it was obtained by the treaters and carried short distances to the individual trees. Mixing the materials in the field presented a number of problems that had to be solved by trial and error. Although the method that was finally devised was fairly satisfactory for the purposes of the experiment, a more efficient one can undoubtedly be worked out if ortho emulsion is proven effective for general control purposes.

On June 25 a 3-man mixing crew was used. The emulsion was prepared in 2½-gallon lots by first adding 100 cc. of Triton to 1/2 gallon of ortho and thoroughly mixing the two in a 1-gallon glass jug. This mixture was then added to 2 gallons of water in a 5-gallon ortho can and the whole thoroughly agitated by shaking for several minutes. Because of several drawbacks this method was used in the treatment of only 12 trees. The Triton caused formation of excessive foam that was difficult to remove from the containers, especially during the cool morning hours. Shaking the containers by hand was a very laborious process that was easily slighted as the mixing progressed. Furthermore it was difficult for a 3-man mixing crew to supply material enough for one 2-man treating crew.

On June 26 a more suitable method was devised. The ortho and Triton were mixed in a glass container as on the preceding day. This mixture was then added to the required amount of water in a garbage can, large enough that 10 gallons could be mixed at a time. The liquid was thoroughly agitated for several minutes with an axe handle. Following this change of technique there was no difficulty with foaming. The mixing crew was reduced to 2 men who were able to keep up with four 2-man treating crews, move to successive treating centers, and still have considerable non-effective time. The garbage can, with its two handles, made an easily carried container for the various pieces of mixing equipment.

A total of 177 gallons of mixture was used in treating 61 trees with a single application and 10 trees with a double application. This amounted to 2.19 gallons for the singly treated trees and 4.38 gallons for those with two applications. Reduced to the amount of ortho, the toxic ingredient, this was 0.44 gallons per singly treated tree and 0.88 for the doubly treated ones. This may be compared with the average of 1.62 gallons of ortho and diesel oil per singly treated tree used in the experimental treatment of 1,235 trees in this same general area during the spring of 1940.[2/] In that experiment the average amount of ortho per treated tree was 0.32 gallons;

2/ Gibson, A. L. Sept. 3, 1940. Office report from the Coeur d'Alene station entitled, "Wasatch Experimental Control Project"

however, diesel oil in addition to acting as a carrier for the ortho is itself toxic to pine beetle brood.

Costs. No cost records were kept for the experiment was set up merely to determine whether the method showed promise. That it would be less costly than the ortho and diesel oil method seems obvious.

Results. On July 8 the treating area was revisited and 25 of the treated trees and 3 checks were sampled. Mortality was complete on the top side of all trees. This was attributed wholly to sun curing. On the sides and bottoms of the logs very little mortality was found. In 24 trees only a few dead larvae, comparable in number to those in the checks, were found. In one doubly treated tree there was considerable mortality that seemed to have resulted from the treatment but even in this tree the survival was great enough to mark the treatment as a failure. Brood development in the treated trees appeared normal and had advanced considerably since the treating. Nineteen trees, including the checks, contained larvae and pupae and one of these also contained new adults.

On September 16 and 17 most of the treated trees were re-examined to determine how many contained sufficient hold-over brood to justify treating. No further evidence of mortality resulting from the treatment was observed. Considerable emergence had taken place from most of the trees but living larvae, pupae, and new adults were still present in most of them. This delayed development was also characteristic of standing trees in this area and is attributed to other factors that have been previously discussed.

A by-product of the experiment was the discovery that the white color of Triton remains on logs several minutes after treatment. This is long enough to greatly facilitate even coverage of the treated logs. While the cost of Triton is probably too high to allow its use solely as a coloring agent, the experience gained through its use indicates that some less costly, but equally effective material, would be a great help in the oil spray method. It is understood that experiments with oil soluble dyes will be undertaken by the Coeur d'Alene station.

Recommendations. The results of the experiment, while not entirely negative, are far from promising. Nevertheless, the financial savings theoretically possible through the use of water rather than oil as a carrier for ortho are such that further tests are very desirable. It is suggested that such tests be undertaken wholly on an experimental basis so that the various factors can be fully investigated. Postponement of further administrative tests until the basic experimental work is done seems desirable.